CLAIMS:

1. An ultrasonic imaging apparatus comprising:

an ultrasonic probe including a plurality of ultrasonic transducers for transmitting ultrasonic waves in accordance with a plurality of drive signals to form at least one ultrasonic beam toward an object to be inspected and receiving ultrasonic echoes reflected from the object;

signal processing means at transmitting-side for providing delays to the plurality of drive signals to be supplied to said ultrasonic probe so as to scan the object by using the at least one ultrasonic beam transmitted from said ultrasonic probe with a scanning line density;

signal processing means at receiving-side for processing a plurality of electric signals obtained by receiving the ultrasonic echoes to obtain a plurality of detection signals representing ultrasonic information along a plurality of scanning lines respectively;

determination means for determining continuity of a boundary of medium residing within the object on the basis of the plurality of detection signals obtained by said signal processing means at receiving-side; and

control means for setting up, after setting up a first scanning line density, a second scanning line density higher than the first scanning line density for said signal processing means at transmitting-side on the basis of a determination result of said determination means.

2. An ultrasonic imaging apparatus according to claim 1,

wherein:

said determination means determines the continuity of boundary of medium on the basis of a plurality of detection signals obtained by scanning predetermined scanning regions with the first scanning line density to obtain a region of discontinuous boundary; and

said control means controls said signal processing means at transmitting-side to scan the region of discontinuous boundary detected by said determination means with the second scanning line density higher than the first scanning line density.

3. An ultrasonic imaging apparatus according to claim 2, wherein said control means controls said signal processing means at transmitting-side to scan, after scanning predetermined scanning regions with the first scanning line density, the region of discontinuous boundary detected by said determination means with the second scanning line density higher than the first scanning line density.

4. An ultrasonic imaging apparatus according to claim 2, wherein said control means controls said signal processing means at transmitting-side to scan, when the region of discontinuous boundary is detected by said determination means, the region of discontinuous boundary prior to remaining scanning regions with the second scanning line density higher than the first scanning line density.

5. An ultrasonic imaging apparatus according to claim 1, wherein;

said determination means determines, in the case where a changing rate of an amplitude of any one of the plurality of detection signals as to the plurality of scanning lines becomes larger than a predetermined value at a time point, that a boundary of medium resides at a position corresponding to the time point; and

said determination means determines, in the case where the time point when it has been determined that a boundary of medium resides on the basis of a first detection signal as to a first scanning line is included in a predetermined period with reference to a time point when it has been determined that a boundary of medium resides on the basis of a second detection signal as to a second scanning line adjacent to the first scanning line, that the boundary of medium is continuous as to the first and second detection signals.

6. An ultrasonic imaging apparatus according to claim 2, wherein:

said determination means determines, in the case where a changing rate of an amplitude of any one of the plurality of detection signals as to the plurality of scanning lines becomes larger than a predetermined value at a time point, that a boundary of medium resides at a position corresponding to the time point; and

said determination means determines, in the case where the time point when it has been determined that a boundary of medium resides on the basis of a first detection signal

as to a first scanning line is included in a predetermined period with reference to a time point when it has been determined that a boundary of medium resides on the basis of a second detection signal as to a second scanning line adjacent to the first scanning line, that the boundary of medium is continuous as to the first and second detection signals.

7. An ultrasonic imaging apparatus according to claim 1, further comprising:

calculating means for performing calculation for estimating a position where a boundary of medium resides in a third scanning line by using at least first and second detection signals as to first and second scanning lines, wherein:

said determination means determines whether or not a boundary of medium in the second scanning line and a boundary of medium in the third scanning line are continuous with each other on the basis of the position estimated by said calculating means.

8. An ultrasonic imaging apparatus according to claim 2, further comprising:

calculating means for performing calculation for estimating a position where a boundary of medium resides in a third scanning line by using at least first and second detection signals as to first and second scanning lines, wherein:

said determination means determines whether or not a

boundary of medium in the second scanning line and a boundary of medium in the third scanning line are continuous with each other on the basis of the position estimated by said calculating means.

9. An ultrasonic imaging apparatus according to claim 2, wherein said control means controls said signal processing means at transmitting-side to scan predetermined scanning regions with the first scanning line density and scan the region of discontinuous boundary detected by said determination means with the second scanning line density higher than the first scanning line density thereby performing a pre-imaging, and to perform an actual imaging on the basis of detection signals as to a plurality of scanning lines obtained in the pre-imaging.

10. An ultrasonic imaging apparatus according to claim 9, further comprising:

a second determination means for determining whether or not there resides any reflection source that causes interference between a plurality of ultrasonic echoes, which are generated by being reflected from a plurality of different reflection sources respectively, when the plurality of ultrasonic echoes are received by said ultrasonic probe, on the basis of the detection signals obtained in the pre-imaging, wherein:

said control means sets up scanning conditions including transmission timing of a plurality of ultrasonic beams to be transmitted in a plurality of directions within a

predetermined period, on the basis of a determination result of said second determination means; and

said signal processing means at transmitting-side provides delays to the plurality of drive signals to be supplied to said ultrasonic probe in accordance with the scanning conditions set up by said control means such that said ultrasonic probe transmits the plurality of ultrasonic beams to scan a plurality of regions within the object respectively.

11. A method of imaging an object to be inspected by using an ultrasonic probe including a plurality of ultrasonic transducers for transmitting ultrasonic waves in accordance with a plurality of drive signals to form at least one ultrasonic beam toward the object and receiving ultrasonic echoes reflected from the object, said method comprising the steps of:

(a) scanning the object by using the at least one ultrasonic beam transmitted from said ultrasonic probe with a first scanning line density while providing delays to the plurality of drive signals to be supplied to the ultrasonic probe;

(b) processing a plurality of electric signals obtained by receiving the ultrasonic echoes to obtain a plurality of detection signals representing ultrasonic information along a plurality of scanning lines respectively;

(c) determining continuity of a boundary of medium residing within the object on the basis of the plurality of detection signals obtained at step (b); and

(d) changing density of the plurality of scanning lines from a first scanning line density to a second scanning line density higher than the first scanning line density on the basis of a determination result at step (c) to scan the object.

12. A method according to claim 11, wherein step (c) includes the steps of:

determining, in the case where a changing rate of an amplitude of any one of the plurality of detection signals as to the plurality of scanning lines becomes larger than a predetermined value at a time point, that a boundary of medium resides at a position corresponding to the time point; and

determining, in the case where the time point when it has been determined that a boundary of medium resides on the basis of a first detection signal as to a first scanning line is included in a predetermined period with reference to a time point when it has been determined that a boundary of medium resides on the basis of a second detection signal as to a second scanning line adjacent to the first scanning line, that the boundary of medium is continuous as to the first and second detection signals.